METHOD AND APPARATUS FOR SELLING AN AGING FOOD PRODUCT

CROSS REFERENCE TO CO-PENDING APPLICATIONS

The present application is a continuation-in-part application of patent application Ser. No. 08/920,116, entitled METHOD AND SYSTEM FOR PROCESSING SUPPLEMENTARY PRODUCT SALES AT A POINT-OF-SALE TERMINAL, filed on Aug. 26, 1997, and issued as U.S. Pat. No. 6,119,099 on Sep. 12, 2000 which is a continuation-in-part of co-pending patent application Ser. No. 08/822,709, entitled SYSTEM AND METHOD FOR PERFORMING LOTTERY TICKET TRANSACTIONS UTILIZING POINT-OF-SALE TERMINALS, filed on Mar. 21, 1997, each of which are incorporated herein by reference.

The present invention is related to the following co-pending U.S. patent applications:

U.S. patent application Ser. No. 08/923,683 entitled "Conditional Purchase Offer (CPO) Management System for Packages" filed on Sep. 4, 1997 in the name of Jay S. Walker et al.; and U.S. patent application Ser. No. 09/012,163 entitled "Method and Apparatus for Automatically Vending a Combination of Products" filed on Jan. 22, 1998 in the name of Jay S. Walker et al., each assigned to the assignee of the present invention and incorporated by reference herein.

FIELD OF THE INVENTION

The present invention relates to methods and apparatus for selling aging food products.

BACKGROUND OF THE INVENTION

Many quick service restaurants will sell food products for some time after those food products have been prepared. For example, hamburgers may be available for sale up to twenty minutes after being cooked. Food products that are excessively aged become "perished" (e.g. stale or soggy). Selling such perished food products would hurt the reputation of the restaurant. Furthermore, aged food products can pose a significant health risk to consumers, which in turn would impose liability on the restaurant. Accordingly, if the food product is not sold within a certain time period after being prepared it is typically thrown away. This waste is considered a cost of doing business.

Some modern quick service restaurants have systems for reducing the waste associated with excessively aged food products. For example, some restaurants include a demand forecasting apparatus that attempts to predict future demand for various food products. Such predictions are used to determine types and quantities of food products to be prepared. Perfect predictions would allow a restaurant to eliminate significant amounts of waste since only those food products about to be ordered would be prepared. Unfortunately, applicants are unaware of any demand forecasting apparatus that is capable of making predictions with anywhere near perfect accuracy. Accordingly demand forecasting apparatus do not eliminate waste in restaurants.

Restaurants may use various processes and apparatus to keep food products fresher for longer periods of time after cooking. For example, the Welbilt UHC4TP Universal Holding Cabinet retains cooked food components, such as hamburger patties and chicken patties, and keeps those food components fresh until they are assembled into food products, such as hamburgers and chicken sandwiches. For example, hamburger patties may be cooked on a grill and then placed in the Universal Holding Cabinet, where they remain for up to a predetermined length of time. A timer measures the length of time that the patty is in the Universal Holding Cabinet. Food components are typically assembled only when there is a need for a certain food product. Such a need may arise from an actual order for the food product or from a predicted (anticipated) order generated by a demand forecasting apparatus. For example, if hamburgers are or will be needed, the hamburger patties are removed from the Universal Holding Cabinet and assembled into hamburgers.

If a food component is not removed from the Universal Holding Cabinet before the timer reaches the predetermined time, the patty is considered not sellable and is discarded. Similarly, once a food product has been assembled, there is a limited time period within which the food product may be sold. For example, an assembled hamburger may be discarded after twenty minutes. Assembled food products are maintained in a warming bin or similar warming apparatus while they await sale, as are other food products that are ready to sell yet require no assembly.

Thus, food products and food components are often discarded at considerable cost to the restaurant. The various methods and apparatus that restaurants may employ serve to somewhat reduce this significant waste. It would be advantageous to further reduce the costs associated with the inability to sell perished food products.

SUMMARY OF THE INVENTION

It is an object of the present invention to reduce the costs associated with the inability to sell all food products that are prepared in a restaurant.

In accordance with the present invention, an automated kitchen apparatus determines a time until expiration of a food product. In one embodiment, the kitchen apparatus determines the time until expiration by receiving a start signal indicating that a food product is available to sell. Such a start signal may be generated by a timer on a warming bin that is initiated when a food product is placed in the warming bin. By measuring the elapsed time since the start signal was received, the time until expiration is determined.

Based on the time until expiration, the automated kitchen apparatus sets the minimum price of that food product. Customers at a POS terminal may then purchase the aged food product for the minimum price, or in another embodiment for an amount that is greater than the minimum price. In one embodiment, an offer describing the food product and its minimum price is displayed on the POS terminal. In another embodiment, the customer is offered the food product for his change due, if that change due is not less than the minimum price.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of a restaurant apparatus provided in accordance with the present invention.

FIG. 2 is a schematic illustration of a POS terminal of the restaurant apparatus of FIG. 1.

FIG. 3 is a schematic illustration of another embodiment of the POS terminal of FIG. 2.

FIG. 4 is a schematic illustration of a store server of the restaurant apparatus of FIG. 1.

FIG. 5 is a schematic illustration of an inventory database of the store server of FIG. 4.

FIG. 6 is a schematic illustration of an aged inventory database of the store server of FIG. 4.

FIG. 7 is a schematic illustration of an automated kitchen apparatus of the restaurant apparatus of FIG. 1.

FIG. 8 is a flow chart illustrating a method for selling an aging food product provided in accordance with the present invention.

FIG. 9 is a schematic illustration of another embodiment of the automated kitchen apparatus of FIG. 7.

FIGS. 10A and 10B are a flow chart illustrating another embodiment of a method for selling an aging food product provided in accordance with the present invention.

FIG. 11 is a schematic illustration of a record of an embodiment of a price adjustment database of FIG. 4.

FIG. 12 is a schematic illustration of an embodiment of a price adjustment database of FIG. 4.

FIG. 13 is a schematic illustration of a record of an embodiment of a price adjustment database of FIG. 4.

FIG. 14 is a flow chart illustrating another embodiment of a method for selling an aging food product provided in accordance with the present invention.

FIGS. 15A and 15B are flow charts illustrating another embodiment of a method for selling an aging food product provided in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention allows a restaurant or similar entity to significantly reduce costs and thus increase profits by identifying and selling aged food products that would otherwise have been discarded. Food products are maintained in warming bins while they await being sold. If a food product in a warming bin cannot be used to satisfy an order (whether an actual or anticipated order), then a POS terminal or other device provides an offer to sell the food product for a reduced price. If the offer is accepted, the food product is sold and registered as no longer available for sale. Thus by automatically tracking aged food products, determining appropriate prices for those food products, and dynamically adjusting a database of available food products, a restaurant may further reduce the waste associated with aged food products.

Referring to FIG. 1, a restaurant apparatus 10 includes point-of-sale ("POS") terminals 12, 14 and 16, each of which are in communication with a store server 18. The POS terminals 12, 14 and 16 may be, for example, the PAR Microsystems POS III or POS IV. The POS terminals 12, 14 and 16 perform such processes as calculating the total price of a purchase (goods or services) and calculating the amount of change due to a customer. The POS terminals 12, 14 and 16 may furthermore track purchases made and adjust databases of inventory accordingly. Any number of POS terminals may be included in the restaurant apparatus 10. Although three POS terminals are shown in FIG. 1, any number of POS terminals may be in communication with the store server 18 without departing from the spirit and scope of the present invention.

The store server 18 directs the operation of, stores data from and transmits data to the POS terminals 12, 14 and 16. The store server 18 may itself be a POS terminal, as described herein, or may be another computing device that can communicate with one or more POS terminals. Each of the POS terminals 12, 14 and 16 may be located in the same store, in different stores of a chain of stores, or in other locations. The store server 18 may perform many of the processes described below, especially those processes that are performed for more than one POS terminal. The store server 18 may furthermore store data, such as an inventory database, that is to be shared by the POS terminals 12, 14 and 16. Similarly, data described herein as stored on the store server 18 may be stored on the POS terminals 12, 14 and 16, as appropriate.

The store server 18 is also in communication with an automated kitchen apparatus 20. The automated kitchen apparatus 20, described in further detail below, includes components for preparing food products for sale to customers. The store server 18 receives from the automated kitchen apparatus 20 an indication of aged food products that should be sold. The store server 18 in turn communicates with the POS terminals 12, 14 and 16, where customers may be sold such aged food products.

FIG. 2 illustrates a POS terminal 30 that is descriptive of any or all of the POS terminals 12, 14 and 16 (FIG. 1). The POS terminal 30 comprises a processor 32, such as one or more conventional microprocessors. The processor 32 is in communication with a data storage device 34, such as an appropriate combination of magnetic, optical and/or semiconductor memory. The processor 32 and the storage device 34 may each be (i) located entirely within a single computer or other computing device; (ii) connected to each other by a remote communication medium, such as a serial port cable, telephone line or radio frequency transceiver; or (iii) a combination thereof. For example, the POS terminal 30 may comprise one or more computers that are connected to a remote server computer for maintaining databases.

An input device 36 preferably comprises a keypad for transmitting input signals, such as signals indicative of a purchase, to the processor 32. The input device 36 may also comprise an optical bar code scanner for reading bar codes and transmitting signals indicative of those bar codes to the processor 32. A printer 38 is for registering indicia on paper or other material, thereby printing waste receipts, sales receipts and coupons as controlled by the processor 32. A display device 40 is preferably a video monitor for displaying at least alphanumeric characters to the customer and/or cashier. Many types of input devices, printers and display devices are known to those skilled in the art, and need not be described in detail herein. The input device 36, printer 38 and display device 40 are each in communication with the processor 12.

The storage device 34 stores a program 42 for controlling the processor 32. The processor 32 performs instructions of the program 42, and thereby operates in accordance with the present invention, and particularly in accordance with the methods described in detail herein. The program 42 furthermore includes program elements that may be necessary, such as an operating system and "device drivers" for allowing the processor 32 to interface with computer peripheral devices, such as the input device 36, the printer 38 and the display device 40. Appropriate device drivers and other necessary program elements are known to those skilled in the art, and need not be described in detail herein.

FIG. 3 illustrates another embodiment of a POS terminal 30. in which a control device 59 is in communication via a communication medium 60 with a system 62 for providing an offer for an upsell. The control device 59 comprises a processor 64 in communication with the input device 36 and the display device 40. The system 62 for providing an offer comprises a processor 66 in communication with the storage device 34 and the printer 38. In this embodiment, the control device 59 may be a cash register, and the system 62 may be an electronic device for printing coupons in accordance with data received from the cash register. Other configurations of the POS terminal 30 will be understood by those skilled in the art.

FIG. 4 illustrates the store server 18 (FIG. 1), which comprises a processor 80, such as one or more conventional microprocessors, such as the INTEL PENTIUM® microprocessor. The processor 80 is in communication with a data storage device 82, such as an appropriate combination of magnetic, optical and/or semiconductor memory, as is apparent to those skilled in the art. The processor 80 and the storage device 82 may each be (i) located entirely within a single computer or other computing device; (ii) connected to each other by a remote communication medium, such as a serial port cable, telephone line or radio frequency transceiver; or (iii) a combination thereof. For example the store server 18 may comprise one or more conventional computers that are connected to a remote server computer for maintaining databases.

An input device 84 preferably comprises a keypad for transmitting input signals to the processor 80. A printer 86 is for registering indicia on paper or other material, thereby printing reports and other documents as controlled by the processor 80. A display device 88 is preferably a video monitor for displaying at least alphanumeric characters. Many types of input devices, printers and display devices are known to those skilled in the art, and need not be described in detail herein. The input device 84, printer 86 and display device 88 are each in communication with the processor 80.

The storage device 82 stores a program 90 for controlling the processor 80. The processor 80 performs instructions of the program 90, and thereby operates in accordance with the present invention, and particularly in accordance with the methods described in detail herein. The program 90 furthermore includes program elements that may be necessary, such as an operating system and "device drivers" for allowing the processor 80 to interface with computer peripheral devices, such as the input device 84, the printer 86 and the display device 88. Appropriate operating systems, device drivers and other necessary program elements are known to those skilled in the art, and need not be described in detail herein.

The storage device 82 also stores (i) inventory database 92; (ii) aged inventory database 94; and (iii) price adjustment database 96. The databases 92, 94 and 96 are described in detail below and depicted with exemplary entries in the accompanying figures. As will be understood by those skilled in the art, the schematic illustrations and accompanying descriptions of the databases presented herein are exemplary arrangements for stored representations of information. A number of other arrangements may be employed besides the tables shown. Similarly, the illustrated entries represent exemplary information, and those skilled in the art will understand that the number and content of the entries can be different from those illustrated herein.

Referring to FIG. 5, the inventory database 92 includes entries 110, 112, 114 and 116, each defining a food product. Each entry includes (i) a food product identifier 118 that uniquely identifies the food product; (ii) a description 120 of the food product; and (iii) a retail price 122 of the food product. Information stored in the inventory database 92 is available to the POS terminals 12, 14 and 16 (FIG. 1), so that any POS terminal may, for example, calculate a price of a purchase that includes one or more food products that are ordered. The information stored in the inventory database 92, particularly the selection of available food products and their retail prices, is typically established by a restaurant manager or other personnel.

Referring to FIG. 6, the aged inventory database 94 includes entries 130, 132, 134 and 136, each defining a food product that has aged excessively and thus is desirable to sell

at a reduced price, rather than be discarded. Each entry includes (i) a food product identifier 138 that uniquely identifies the aged food product, and that corresponds to the food product identifier 118 (FIG. 5); (ii) a description 140 of the aged food product; (iii) a quantity 142 of the aged food product that is available to sell at a reduced price; and (iv) a minimum price 144 of the aged food product. As described below, an aged food product may be sold for an amount equal to the minimum price, or in another embodiment may be sold for an amount equal to or greater than the corresponding minimum price of the food product.

Information stored in the aged inventory database 94 is available to the POS terminals 12, 14 and 16 (FIG. 1), so that any POS terminal may provide an indication of aged food products that are currently available for sale. The information stored in the aged inventory database 94 is typically established by the automated kitchen apparatus 20, as described in detail below.

Referring to FIG. 7, the automated kitchen apparatus 20 includes warming bins 160 that hold cooked food products that are available for sale and keep those food products warm while they await being sold. Suitable apparatus for holding food products that are available for sale will be apparent to those skilled in the art.

The warming bins 160 are in communication with a timer 162 that is used in determining the time until expiration of each food product in the warming bins 160. The timer 162 can be any known device for measuring elapsed time or otherwise counting at predetermined intervals. The expiration of a food product is defined as the point at which the food product has "perished" (is no longer considered sellable), such as when the food product is undesirably cold, stale, melted, soggy or otherwise unsavory. Typically, the expiration is deemed to occur a predetermined length of time after a food product has been cooked and placed in the warming bins 160. Different food products will have different lengths of time until they expire (e.g. twenty minutes for hamburgers, thirty minutes for apple pies).

The timer 162 includes a "start timer" input 164 that generates and transmits a start signal for each food product. The start signal is used by the timer 162 to initiate measurement of the age of a food product. The start signal may also be transmitted to another device that counts elapsed time since receiving the start signal, and therefor determines the age of a food product. In one embodiment, the start timer input 164 automatically generates a start signal when a food product is placed in the warming bins 160. For example, the warming bins 160 may include pressure plates (not shown) or other sensors that are actuated when food products are placed thereon. The pressure plates in turn send signals to the start timer input 164. The start timer input 164, in response, generates the start signal(s) for the corresponding food product(s). In another embodiment, the start timer input 164 can comprise one or more input buttons, each corresponding to a food product. A start signal is generated when a cook or other personnel actuates a button of the start timer input 164. In such an embodiment, there would typically be a corresponding button for each of a plurality of locations in the warming bins 160 where food products may be placed. The cook may actuate the appropriate button when he places a food product in the warming bins 160.

The timer 162 may also include an output 166 that provides an indication of the time until expiration of each food product in the warming bins 160. For example, the output 166 may be a liquid crystal display (LCD) that displays alphanumeric text (e.g. minutes and seconds) for each food product in the warming bins **160**. Alternatively, the output **166** may simply indicate, for each food product, an age category of the food product. For example, the output **166** may comprise a plurality of light-emitting diodes (LEDs), each corresponding to a food product and each providing constant illumination (e.g. if the food product is very fresh) or intermittent illumination (flashing) (e.g. if the food product is aged). The output **166** may further indicate the age of each food product by color (e.g. green for fresh, red for aged). The output may provide audio output (e.g. beep when the corresponding food product is aged).

The timer **162** is in communication with a demand forecasting apparatus **168** that attempts to predict future demand for various food products and issue instructions to prepare those food products if necessary. The demand forecasting apparatus **168** may be the MCDONALD'S® "Just-In-Time" software which forecasts demand and orders food products in anticipation of the forecasted demand. The demand forecasting apparatus **168** is in communication with a printer **170** for printing waste receipts and a monitor **172** for displaying information regarding predicted food products. For example, the monitor may display instructions to restaurant employees directing them to prepare various types and quantities food products.

The demand forecasting apparatus **168** receives from the timer **162** signals from which may be determined (i) the quantity and types of food products awaiting sale in the warming bins **160**; and (ii) the time until expiration of each food product in the warming bins **160**. Table 1 below describes several possible formats for the signals transmitted by the timer. Still further formats will be understood by those skilled in the art.

TABLE 1

Timer Signal Formats

Format	When Transmitted	Example
"START 1"	when placed in warming bins	Hamburger (transmitted at 4:18:38 PM) Hamburger (transmitted at 4:19:24 PM)
"START 2"	periodically or as requested	Hamburger: started at 4:18:38 PM Hamburger: started at 4:19:24 PM
"EXPIRES 1"	periodically or as requested	Hamburger: expires at 4:38:38 PM Hamburger: expires at 4:39:24 PM
"EXPIRES 2"	periodically or as requested	Hamburger: expires in 0:03:38 Hamburger: expires in 0:04:24
"AGE"	periodically or as requested	Hamburger: age is 0:16:22 Hamburger: age is 0:15:36

As indicated in Table 1, the timer **162** may periodically transmit signals (e.g. every minute) or may transmit signals as demanded (e.g. upon receiving a request from the demand forecasting apparatus **168**).

Based on the signals received from the timer **162**, the demand forecasting apparatus **168** may (i) determine which food products have expired, and (ii) command the printer **170** to generate corresponding waste receipts. Waste receipts are typically slips of paper upon which are registered indicia describing the type and quantity of food products that are to be disposed of, rather than sold. The demand forecasting apparatus **168** furthermore stores an indication of the type and quantity of food products that are to be disposed of so that inventory may be properly tracked and accounted for. The demand forecasting apparatus **168** also appropriately adjusts its instructions to prepare various types and quantities of food products in accordance with predicted demand and disposed of food products.

Referring to FIG. **8**, a method **180** for identifying aged food products that are desirable to sell at a reduced price may be performed by the demand forecasting apparatus **168** (FIG. 7) and/or the store server **18** (FIG. **1**), as appropriate. The time until expiration of each food product is first determined. One way of determining such a time is to receive the start signal for each food product from the timer **162** of FIG. 7 (step **182**) and measure the corresponding elapsed time since the start signal was received (step **184**). Based on the elapsed time, the time until expiration may be determined. For example, if hamburgers are deemed to expire twenty minutes after being placed in the warming bins **160** (FIG. 7), and the elapsed time is seven minutes, then the time until expiration is thirteen minutes (20–7=13). Alternative ways for determining the time until expiration will be readily understood, particularly with reference to the various possible formats described in Table 1 above.

Based on the time until expiration, a minimum price (described in further detail below) of each food product is set (step **186**). If a food product is not sold (step **188**), it is determined whether the food product has expired (step **190**). One way of determining whether a food product has expired is to determine whether the corresponding elapsed time is less than zero, or some other predetermined threshold. If a food product has not expired, the elapsed time continues to be measured (step **184**). If a food product has expired, a waste receipt is generated (step **192**), and that food product is registered as no longer available for sale (step **194**). Similarly, if a food product is sold (step **188**), that food product is registered as no longer available for sale (step **194**).

Referring to FIG. **9**, another embodiment of the automated kitchen apparatus **20** includes the demand forecasting apparatus **168**, the printer **170** and the monitor **172** described above with reference to FIG. **7**. A food component warmer **210** holds cooked food components, and keeps those food components warm while they await being assembled into food products. The food component warmer **210** may be the Welbilt UHC4TP universal holding cabinet or may be a device utilizing controlled vapor technology ("CVAP"), a cooking, holding and thermalizing technology developed by Winston Industries of Louisville Ky. for maintaining food temperature and moisture content.

The food component warmer **210** is in communication with a timer **212**, which is similar to the timer **62** (FIG. **7**). The timer **212** is used in determining the time until each food component in the food component warmer **210** must be assembled. For example, it may be desirable to limit the time that a hamburger patty may be in the food component warmer **210** to thirty minutes. After thirty minutes, the hamburger patty must be used to assemble a hamburger, or it must be discarded since it has perished. Typically, the time until assembly is required is deemed to occur a predetermined length of time after a food component has been cooked and placed in the food component warmer **210**. Different food components will have different lengths of time until they expire (e.g. thirty minutes for hamburger patties, forty minutes for chicken patties).

The timer **212** includes a "start timer" input **214** that generates and transmits a start signal for each food component. The start signal is used by the timer **212** to initiate measurement of the age of a food component. The start signal may also be transmitted to another device that counts elapsed time since receiving the start signal, and therefor determines the age of a food component. In one embodiment, the start timer input **214** automatically generates a start signal when a food component is placed in the food component warmer **210**. For example, the food component warmer **210** may include pressure plates (not shown) or other sensors that are actuated when food components are placed thereon. The pressure plates in turn send signals to the start timer input **214**. The start timer input **214**, in response, generates the start signal(s) for the corresponding food component(s). In another embodiment, the start timer input **214** can comprise one or more input buttons, each corresponding to a food component. A start signal is generated when a cook or other personnel actuates a button of the start timer input **214**. In such an embodiment, there would typically be a corresponding button for each of a plurality of locations in the food component warmer **210** where food components may be placed. The cook would actuate the appropriate button when he places a food component in the food component warmer **210**.

The timer **212** also includes an output **216** that provides an indication of the time until expiration (i.e. until the food component is aged and should be assembled into a food product) of each food component in the food component warmer **210**. The output **216** is similar to the output **166** (FIG. 7).

When a food component is near or at expiration, it is assembled into a food product if possible. If a cook or other restaurant personnel assembles the food component into a food product, he so indicates using a "food product assembled" input **218**. The food product assembled input **218** may comprise one or more input buttons, each corresponding to a food component. Once assembled, the food product is placed in the warming bins **160**, and the start timer input **164** generates and transmits a start signal, as described above with reference to FIG. 7. In one embodiment, the food product assembled input **218** is the start timer input **164**. In another embodiment, the food product assembled input **218** is a separate device, as will be understood by those skilled in the art.

Referring to FIGS. **10**A and **10**B, another method **230** for identifying aged food products that are desirable to sell at a reduced price may be performed by the demand forecasting apparatus **168** (FIGS. 7 and 9) and/or the store server **18** (FIG. **1**), as appropriate. At step **232**, one or more food components are placed in the food component warmer **210** (FIG. 9), and the time until expiration of each food component is determined. One way of determining such a time is to receive the start signal for each food component (step **234**) from the timer **212** (FIG. 9) and measure the corresponding elapsed time since the start signal was received (step **236**). Based on the elapsed time, the time until expiration may be determined. For example, if hamburger patties are deemed to expire thirty minutes after being placed in the food component warmer **210** (FIG. 9), and the elapsed time is seven minutes, then the time until expiration is twenty three minutes (30–7=23). Alternative ways for determining the time until expiration will be readily understood, particularly with reference to the various possible formats described in Table 1 above.

If a food component is not near or at expiration (step **238**), and if the food component is not needed to fulfill an order (step **240**), then the food component remains in the food component warmer **210**. Otherwise, it is assembled into a food product if possible (step **242**). It may not be possible to assemble an expiring food component (e.g. restaurant personnel are too busy). Accordingly, if a food component expires, it is discarded, and a corresponding waste receipt is generated (step **244**).

If a cook or other restaurant personnel is able to assemble the food component into a food product (step **246**), he so indicates using a "food product assembled" input **218** (FIG. 9), the food product is placed in the warming bins **160** (step **248**), and the time until expiration of the food product is determined. One way of determining such a time is to receive the start signal for the food component (step **250**) from the timer **212** (FIG. 9) and measure the corresponding elapsed time since the start signal was received (step **252**). Based on the elapsed time, the time until expiration may be determined. Similarly, the age of a food product is measured from the time the food product is assembled and placed in the warming bins **160**.

Based on the time until expiration, a minimum price (described in further detail below) of each food product is set (step **254**). If a food product is not sold (step **256**), it is determined whether the food product has expired (step **258**). One way of determining whether a food product has expired is to determine whether the corresponding elapsed time is less than zero, or some other predetermined threshold. If a food product has not expired, the elapsed time continues to be measured (step **252**). If a food product has expired, a waste receipt is generated (step **260**), and that food product is registered as no longer available for sale (step **262**). Similarly, if a food product is sold (step **256**), that food product is registered as no longer available for sale (step **262**).

As described above, a minimum price of a food product is set based on the time until expiration of the food product. The description below will make reference to the time until expiration. However, since the time until expiration may be used to calculate the age of a food product, and vice versa, those skilled in the art will readily understand how to apply the teachings herein to embodiments where the age is used.

Referring to FIG. **11**, a table **280** represents a record of an embodiment of the price adjustment database **96** (FIG. 4), which will typically include a plurality of such records. Each record defines price adjustments for a food product at different ages of that food product. The table **280** includes a record identifier **282** that identifies the food product, typically by the appropriate food product identifier **118** (FIG. 5). The table **280** further includes entries **284** and **286**, each defining a price adjustment for different ages of the food product identified by the record identifier **282**. The entries **284** and **286** each include (i) an age **288** defining an age or age range: and (ii) a price **290** of the food product having that age. For example, the entry **284** indicates that hamburgers that have been in the warming bins fifteen minutes or less are to be sold at retail price. Any older hamburgers are sold for a customer's change due, as is described in more detail below.

Referring to FIG. **12**, a table **300** represents another embodiment of the price adjustment database **96** (FIG. 4). The table **300** defines price adjustments for food products at different ages. The table **300** includes entries **302**, **304** and **306**, each defining a price adjustment for different ages. Each entry includes (i) an age **308** defining an age or age range; and (ii) a price **310** of any food product having that age. For example, the entry **304** indicates that food products that have been in the warming bins between sixteen minutes and seventeen minutes are to be sold at 50% of retail price.

Retail prices of food products are stored in the inventory database **92** (FIG. 5).

Referring to FIG. **13**, a table **320** represents a record of another embodiment of the price adjustment database **96** (FIG. 4), which will typically include a plurality of such records. Each record defines price adjustments for a food product at different ages of that food product. The table **320** includes a record identifier **322** that identifies the food product, typically by the appropriate food product identifier **118** (FIG. 5). The table **320** further includes entries **324**, **326** and **328**, each defining a price adjustment for different ages of the food product identified by the record identifier **322**. Each entry includes (i) an age **330** defining an age or age range; (ii) a minimum price **332** of the food product having that age; and (iii) a maximum price **334** of the food product having that age. In such an embodiment, each entry defines a range of prices for which a food product having a particular age may be sold. For example, the entry **324** indicates that hamburgers that have been in the warming bins fifteen minutes or less are to be sold for the retail price (i.e. between $0.69 and $0.69). Similarly, the entry **328** indicates that hamburgers that have been in the warming bins more than eighteen minutes are to be sold for any amount less than the retail price (i.e. between $0.00 and $0.69).

As will be understood from the above description, the price adjustments for food products may vary with the age of the food product in numerous ways. For example, the price of an food product may decrease proportionally with its age (e.g. $0.05 per minute). Alternatively, there may be a schedule of fixed reductions in the retail price that varies with age (e.g. $0.25 for ages 5–10 minutes, $0.50 for ages 11–20 minutes).

Referring again to FIGS. **11**, **12** and **13**, the illustrated entries each describe age ranges, which may be referred to as "age categories". For example, the entry **326** defines an age range from sixteen minutes to eighteen minutes old (a first age category), and the entry **326** defines an age range from sixteen minutes to eighteen minutes old (a second age category). The aged inventory database **94** (FIG. **6**) stores indications of food products that have aged excessively and thus are desirable to sell at a reduced price, rather than be discarded. The aged inventory database **94** may be considered as storing indications of food products that correspond to one or more predetermined age categories (e.g. all age categories except the first age category).

The POS terminals **12**, **14** and **16** (FIG. **1**) have access to the aged inventory database **94**, which describes food products that have aged excessively and thus are desirable to sell at a reduced price, rather than be discarded. The POS terminals **12**, **14** and **16** also have access to the price adjustment database **96**, which defines price adjustments for food products at different ages of that food product. Accordingly, the POS terminals **12**, **14** and **16** may determine which excessively aged food products are available, as well as prices at which to sell those food products.

FIG. **14** describes a method **340** performed by a POS terminal of the restaurant apparatus **10** (FIG. **1**) for selling an aging food product. If there are not any food products indicated by the aged inventory database **94** (step **342**), then the transaction is processed in a conventional manner (step **344**). If there are one or more food products indicated by the aged inventory database **94**, then a food product is selected (step **346**). If more than one food product is indicated, the food product may be, for example, selected at random or selected based on what the customer has ordered.

The price of the selected food product is determined (step **348**). As described above, the price adjustment database **96** (FIG. 4) is used to determine the price of the food product based on the age of that food product. In one embodiment, the aged food product has a price that is exactly the minimum price specified by the price adjustment database **96**. In another embodiment, the aged food product has a price that is greater than or equal to a minimum price (i.e. a higher price may be charged under certain circumstances). Similarly in still another embodiment, the aged food product has a price that is in a range from a minimum price to a maximum price.

Once the (reduced) price of the selected food product has been determined, an appropriate offer is provided to the customer (step **350**). For example, the POS terminal may display a textual message indicating the selected food product and price to the customer and/or cashier. If the customer does not accept the offer (step **352**), the cashier so indicates by actuating an appropriate button on the POS terminal, and the transaction is processed in a conventional manner (step **344**). If the customer does accept the offer, the aged inventory database is appropriately adjusted (step **353**) to reflect the sold food product. For example, the corresponding quantity indicated for a food product is reduced by one if one food product is sold. In one embodiment a separate inventory database, such as a database of food components available for use in the restaurant, is appropriately adjusted as well (step **354**).

The selected food product is exchanged for the determined price (step **356**), and a signal is sent to the demand forecasting apparatus **168** (FIGS. **7** and **9**) indicating that the food product is has been sold and is no longer available (step **358**). Thus, the demand forecasting apparatus **168** will not erroneously include sold food products in instructing the preparation of anticipated food products.

The parent application of the present application, patent application Ser. No. 08/920,116, entitled METHOD AND SYSTEM FOR PROCESSING SUPPLEMENTARY PRODUCT SALES AT A POINT-OF-SALE TERMINAL, filed on Aug. 26, 1997, describes a method and apparatus in which a customer at a POS terminal is offered an "upsell" in exchange for an amount of change he is due. The POS terminal determines an upsell in dependence on a purchase of the customer, and also determines an upsell price (the amount of change due) based on the purchase. For example, a customer purchasing a first product for $1.74 and tendering $2.00 may be offered a second product in lieu of the $0.26 change due ("round-up amount"). The upsell price, $0.26, thus depends on the purchase price $1.74. Similarly, the $2.00 "rounded price" may also depend on the purchase price $1.74. In this example, the rounded price is the next-greater whole number amount of dollars greater than the purchase price $1.74.

The method and apparatus of the parent application may be advantageously used with the present invention described herein to allow customers to purchase aged inventory for their change due. In particular, since customers generally do not know which food products are aged, it is difficult or impossible for customers to predict which food products will be offered to them. Accordingly, there is a significant randomness in the offers, which prevents customers from successfully taking advantage of the offering process.

FIGS. **15A** and **15B** describes a method **380** performed by a POS terminal of the restaurant apparatus **10** (FIG. **1**) for selling an aging food product. The POS terminal logs on a POS terminal operator (e.g. a cashier) (step **381**), which is typically performed once when an operator begins or resumes operation of the POS terminal (i.e. at the beginning of the operator's shift, or after he has returned from a break). Logging on includes inputting into the POS terminal a unique operator identifier. Thus, subsequent operations performed by or on the POS terminal may be associated with the operator. Benefits to such operating tracking are described below.

During a customer transaction, the POS terminal generates a purchase price and a rounded price (steps **382** and **384**). and therefrom calculates a round-up amount (step **386**). The round-up amount is the difference between the purchase price and the rounded price. The POS terminal then determines whether there exist any food products that correspond to one or more predetermined age categories (step **388**). For example, there may be a first age category that includes food products greater than fifteen minutes old, and a second age category that includes food products less than fifteen minutes old. Food products corresponding to the first age category may be deemed excessively aged, and as such should be exchanged for a customer's change due.

If there are no food products that correspond to the predetermined age categories (i.e. no aged inventory), then the customer transaction is processed in a conventional manner (step **390**). Otherwise, the POS terminal determines whether any of these aged food products have a minimum price that is less than or equal to the round-up amount (step **392**). If any do, at least one is selected and offered to the customer (step **394**). The POS terminal may output an indication of the food product to the operator and/or customer via its display device. For example, the POS terminal may output the text "Would you like a hamburger for your $0.32 change?" Selecting a food product to offer may be based on many criteria. as described below and in the above-cited parent application.

If the offer is accepted by the customer (step **396**), the operator may so indicate via a device (e.g. the input device of the POS terminal) that transmits an acceptance signal to the POS terminal. The aged inventory database is appropriately adjusted (step **398**) to reflect the sold food product. In one embodiment, a separate inventory database, such as a database of food components available for use in the restaurant, is appropriately adjusted as well (step **400**). The selected food product is exchanged for the round-up amount (step **402**), so the customer pays the rounded price for the total purchase including the aged food product. Finally, a signal is sent to the demand forecasting apparatus **168** (FIGS. **7** and **9**) indicating that the food product is has been sold and is no longer available (step **404**).

The above-described step **381** of logging on an operator of the POS terminal allows the acceptance rate of offers to be tracked. For example, a first operator may be very adept at persuading customers to accept an offer for aged food products, while a second operator may not. Accordingly, the acceptance rate of the first operator will be higher than the acceptance rate of the second operator. Tracking the acceptance rate is advantageous if operators receive bonuses or are otherwise compensated based on their average acceptances per offer, number of acceptances per hour, and/or money collected due to accepted offers per hour. Such bonuses may be automatically calculated by a payroll system (e.g. on the store server **18** of FIGS. **1** and **4**) that receives acceptance rates from the POS terminals.

Furthermore, operators that are particularly skilled at providing offers to customers may be prompted by the POS terminal to provide more difficult offers, such as persuading customers to "round up" their purchase price to a greater amount (e.g. to the nearest $5 rather than just the nearest $1). Thus, the customer would have a greater round-up amount and would be able to purchase more food products and/or greater value food products.

Logging on each operator may also advantageously grant each operator the ability to access certain POS terminal functions. For example, it may be advantageous to limit the ability to provide offers for aged food products to certain operators. The restaurant management may not want inexperienced operators to engage in anything but the most basic operations at the POS terminal.

As also described above, selecting a food product to offer may be based on many criteria. For example, various types of information about the customer(s) may be input to the POS terminal and used in selecting an upsell that is likely to be accepted. In one embodiment, the operator may indicate (e.g. by pressing one of a plurality of buttons on the POS terminal) the number of people in the customer's "party" (e.g. one customer. two customers, three customers, more than three). Upsells may then be selected based on the number of people. For example, if two people are in the customer's party, then an upsell of two hamburgers may be more appropriate than one or three food products. Other information about the customer(s) which may be used in selecting an upsell include the weight, age and gender of the customer.

In another embodiment of the present invention, aged food products may be sold in packages that include a plurality of food products. Selling packages of items is described in commonly-owned co-pending U.S. patent application Ser. No. 08/923,683 entitled "Conditional Purchase Offer (CPO) Management System for Packages" filed on Sep. 4, 1997 in the name of Jay S. Walker et al.; and U.S. patent application Ser. No. 09/012.163 entitled "Method and Apparatus for Automatically Vending a Combination of Products" filed on Jan. 22, 1998 in the name of Jay S. Walker et al., each incorporated herein by reference. For example, a plurality of aged food products may be offered to a customer for a package price that is lower than the sum of the (reduced) prices of the individual food products. Such a package price is typically based on the individual reduced prices, and thus is based on the times until expiration of the individual food products. Alternatively, a package may include an aged food product and a food product that is not aged. The corresponding package price may be, for example, the retail price of the food product that is not aged. If so, the offer may be "buy product X, get product Y free". Alternatively, the package price may be the customer's change due if the change due is greater than the retail price of the food product that is not aged.

In one embodiment, the POS terminal generates a round-up amount, and a package is constructed based on the round-up amount and the retail prices of food products in the package. In particular, the sum of the retail prices is greater than the round-up amount. The package is offered in exchange for the round-up amount. If accepted, the customer will recognize a significant benefit since the price paid for the package (the round-up amount) is less than the retail prices the customer would have expected to pay. In this embodiment, the package may include one or more aging food products. Of course the package price may be determined in a number of other ways understood by those skilled in the art.

In many of the embodiments described above, reference was made to an offer provided to the customer, the offer being an exchange of an aged food product for a customer's change due. In another embodiment, the minimum price of